ANALYSIS OF FACTORS AFFECTING INTRA-INDUSTRY TRADE INDEX IN THE ELECTRONIC SECTOR INTRA-ASEAN 3

THESIS

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PADANG
2011

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Bukankah kami telah lapangkan dadamu, dan kami telah menghilangkan dari

padamu bebanmu yang memberatkan punggungmu.

Sesudah kesulitan itu ada kemudahan, maka apabila kamu telah selesai (dari suatu urusan).
Kerjakanlah dengan sungguh2 (urusan yang lain)

Dan hanya kepada Tuhanmulah hendaknya kamu berharap

(QS. Alam NasyRah : 1 – 8)

Alhamdulillahirobbil Alamin

Rasa syukur yang begitu besar kurasakan

Atas nikmat dan karunia-Mu ya Allah

Dan berkat Ridho dan izin-Mu juaLah

Sebuah harapan dan impian ku telah terwujud

Sebagai bekal bagiku untuk meniti hari esok yang masih panjang.

Setetes kebahagian ku persembahkan untuk semua

Terimalah karya kecilku ini sebagai sumbangsihku

Atas semua jerih payahku

Maka izinkanlah aku bersimpuh

Bersujud dan bersyukur atas kehadiratMu ya Allah.

Ku persembahkan karya kecilku kepada orang tuaku

Ayahku (Asril Aras (Alm.)) dan ibundaku (Emi Iriani) tercinta

Doa'mu menentramkan hatiku

Setiap harapanku disinari dengan kasih sayangmu yang tulus

Berkat semua jerih payah dan perjuanganmu

Aku bisa menggapai semua impianku

Dan tiada kata yang dapat aku ucapkan

Selain rasa terima kasih yang tak terhingga

Serta tawa kebahagiaan yang ingin selalu kulihat dari wajahmu

Ayah..... Bunda.....

Kesabaranmu adalah keteladananku

Harapanmu adalah tujuanku

Bayanganmu menjadi pelita dan cahaya hidupku

Doa'mu adalah penuntunku

Aku akan berusaha menjadi yang terbaik

Dan yang akan membahagiakanmu

Ayah..... Bunda.....

Terimalah goresan ini, setetes keringat sebagai bukti atas pengorbanan,

Perhatian dan kasih sayang yang telah kau berikan

Serta dalam doa mengiringi langkahku untuk meraih keberhasilan ini

Menjadi langkah awal dalam meraih cita-cita dan sebuah harapan

Dari awal sebuah masa depan

Karya ini kupersembahkan kepada Saudaraku (Ari Irawan, Angga Vernando, Andre Wahyudi)

Atas kasih sayang dan dukunganmu

Keberhasilan ini bisa kuraih jua

Senyum dan tawamu menjadi inspirasi dan motivasiku dalam belajar

Tak lupa juga buat someone special in my heart

Yang selalu bersama dan memotivasiku

Juga buat sahabat-sahabatku...

Keindahan yang kita ciptakan

Kebahagiaan yang kita nikmati

Suka dan duka kita rasakan

Ku tak ingin semua ini terhenti

Jangan pernah mengingkari persahabatan

Meski perpisahan harus terjadi

Sahabat .... Aku bangga pada kalian semua

With Love

Meza Astria Putri, SE

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Analysis of Factors Affecting Intra Industry Trade in The Electronic Sector Intra-ASEAN3

Thesis by: Meza Astria Putri **Thesis Advisor: Drs. Masrizal, M. Soc. Sc**

ABSTRACT

This research is a study about Analysis of Factors Affecting Intra Industry Trade in the Electronic Sector Intra ASEAN-3. The thesis analyzes the affect by using GLS (Generalized Least Square) of cross-regional data and regress it each year from 2001-2009. In this thesis the writer uses some variables; they are Intra Industry Trade (IIT) as a dependent variable, Gross Domestic Product (GDP), Gross Domestic Product per Capita (PIN), Gross Domestic Product Difference (GDPD), Gross Domestic Product per Capita Difference (PIND) as independent variables. Based on empirical result, the writer suggests that Intra International Trade is significant and has positive relationship in order to increase Gross Domestic Product (GDP), Gross Domestic Product per Capita (PIN), and Gross Domestic Product Difference (GDPD) meanwhile PIN has negative relationship in order to decrease IIT. Furthermore, Gross Domestic Product per Capita Difference (PIND) is not significant but PIND has positive relationship. That means, only PIN gives effect to reduce Intra Industry Trade in the Electronic Sector Intra ASEAN-3.

Keywords: Intra Industry Trade, generalized least square, affect

This thesis has been presented before the examiners in the Thesis Examination and successfully passed the Thesis Examination on January 27th 2011.
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KATA PENGANTAR

Puji dan syukur penulis ucapkan ke hadirat Allah SWT yang telah melimpahkan rahmat dan karunia-Nya sehingga skripsi yang berjudul **Analysis of Factors Affecting Intra Industry Trade in the Electronic Sector Intra ASEAN-3 in Period 2001 – 2009** ini dapat diselesaikan tepat pada waktunya. Shalawat dan salam tidak lupa penulis sampaikan kepada Nabi Muhammad SAW.

Selama proses penulisan skripsi ini, penulis juga menghadapi berbagai kendala. Semua kendala tersebut dapat diatasi berkat bantuan dan bimbingan dari berbagai pihak. Pada kesempatan ini, penulis mengucapkan terima kasih atas bantuan dan bimbingan tersebut, yaitu dari :

1. Bapak Dr. Syafruddin Karimi, SE, MA selaku Dekan Fakultas Ekonomi Universitas Andalas ;
2. Bapak Drs. Masrizal, M. Soc. Sc selaku dosen pembimbing yang telah bersedia meluangkan waktu dan memberi petunjuk, saran dan pengarahan dalam penulisan skripsi ini ;
3. Bapak Prof. DR. H. Firwan Tan, SE, M.Ec, DEA.Ing selaku Ketua Jurusan Ilmu Ekonomi pada Fakultas Ekonomi Universitas Andalas ;
4. Bapak Dr. Syafruddin Karimi, SE, MA dan Bapak Drs. M. Nazer MA, Msi selaku tim pembahas yang telah memberikan saran dan kritk yang membangun demi kesempurnaan skripsi ini ;
5. Seluruh dosen yang mengabdi pada Jurusan Ilmu Ekonomi Fakultas Ekonomi Universitas Andalas yang tidak dapat penulis sebutkan satu persatu ;

6. Bapak dan Ibu karyawan biro Jurusan Ilmu Ekonomi dan pegawai Dekanat Fakultas Ekonomi yang telah membantu proses kelancaran administrasi selama penulis kuliah di Fakultas Ekonomi Universitas Andalas ;
7. Kedua orang tuaku tercinta yang begitu sabar membesarkan dan membimbing penulis serta memberikan semangat, dorongan dan doa kepada penulis serta kepada dua orang kakakku dan adikku yang selalu berada dalam kecintaan dan kasih sayang. Semoga kita selalu berada di bawah naungan ridho illahi ;
8. Semua teman – temanku yang telah memberikan suasana kondusif, support, dan semangat sehingga penulis bisa nyaman dan lebih fokus dalam penulisan skripsi ;
9. Seluruh Kakak-kakak Alumni Jurusan Ilmu Ekonomi Angkatan 2004, serta adik-adik satu jurusan, terima kasih atas dukungan dan bantuannya selama ini, sukses juga buat kalian semua.

Meskipun demikian, penulis menyadari bahwa skripsi ini masih jauh dari kesempurnaan, hal ini dikarenakan keterbatasan pengetahuan penulis. Oleh karena itu penulis mengharapkan kritk dan saran dari pembaca sehingga skripsi ini dapat lebih bermanfaat.

Padang, January 2^{nd}2011

Penulis

LIST FIELD

LIST TABLE

LIST FIGURE

CHAPTER I

INTRODUCTION

1.1 Background

Economic globalization can be interpreted as a process, where more countries are involved in global economic activity (Tambunan, 2004). Thus, the relationship between countries can be more open. This has increased the interdependence of economic relations as well as competition between countries, trade, investment, and finance. There are several sectors driving economic globalization, are the progress of science & technology, increase in average income of the world community, and increasing world population density. In addition, which is the main driving factor is trade liberalization and world finance (Tambunan, 2004).

Liberalization of world trade is characterized by increasing rapidly flow of goods and services between countries. In this framework, some areas have been declared free trade by eliminating trade barriers, even in tariff barriers and non tariff barriers (NTBs). Thus, each country is expected to rely on commodity, that have comparative advantage and competitive to increase trade in the region, that eventually turn to promote economic growth and welfare population.

Therefore, as an open country, Indonesia is committed to participate in free trade in various. In ASEAN region, since 1992, Indonesia incorporated into ASEAN Free Trade Area (AFTA). AFTA is a form of agreement from ASEAN countries to establish a free trade in order to enhance regional economic competitiveness of ASEAN, by creating

regional market for its population and make ASEAN as a production base of the world, so can to attract investment and increase trade between countries of ASEAN members, through the Common Effective Preferential Tariff (CEPT) (Deperindag, 2002).

CEPT is gradual tariff reduction program to be 0-5 percent and elimination of NTBs. However, not all commodities were circulating in ASEAN region to obtain CEPT concessions. Commodities than can obtain CEPT concessions must have a local content of ASEAN at least 40 percent. In additional, in the CEPT scheme, there is division of tariff reduction program into fast track and normal track. Fast track applied on 15 groups of commodities, including textiles, rubber, fertilizers, electronics, and furniture. For previously commodity had rates equal to or below 20%, will reduced tariff to 0-5 percent start January 1, 1998. Meanwhile, for rates above 20 percent will reduce to 0-5 percent start January 1, 2000 (Anggraeni, 2004). In KTT ASEAN in Hanoi 1998, has agreed to full implementation of AFTA on January 1, 2002, with flexibility. Flexibility means that for some commodity that is still felt not ready, it can be postponed until January 1, 2003 for ASEAN-6, while for Vietnam, Laos, Myanmar, and Cambodia respectively in 2006, 2007, 2008, 2009, and 2010 (Deperindag, 2002).

Furthermore, in order to improve economic integration within the ASEAN region, ASEAN Bali Concord II in November 2003, ratified the *ASEAN Economic Community* (AEC) in 2020, as the realization of the ultimate objective of economic integration process within the ASEAN region. The goal is to create stability, prosperity, and economic competitiveness of ASEAN regional, where there is freedom in the flow of

goods, services, investment, and capital between countries. In addition, AEC is also aimed to economic development and poverty reduction (ASEAN Secretariat 2004).

For that, on November 29, 2004, it defined 11 priority sectors within Agreement framework for the Integration of priority sectors, such as: electronics, ICT, automotive, textiles, and tourism. Each sector has a roadmap is stipulated in ASEAN region integration protocol that shown how the process of integration (ASEAN Secretariat, 2004).

Electronics sector is the one of main driving factors in the ASEAN economies. This is shown by the size of average electronic exports intra-ASEAN from total extra-ASEAN during the period 1997-2001, around 8.1 percent per year. In addition, ASEAN's export market share of world export markets during the period 1997-2001 was dominated by electronics and ICT sectors, i.e. 16-18 percent per year (Austria, 2004).

The electronic trade sector in the ASEAN region is concentrated in a few commodities. The high concentration was impact on specialization in production activities. Further, the ASEAN export and import the same commodity, to and from the same country (Austria, 2004). This characteristic strengthened by the relative highly degree of integration of electronic sector in each country of ASEAN, as shown by the Intra-industry Trade Index (IIT) in the electronic sector in each countries. The amount of IITI describes the magnitude of export and import commodities from same industry (intra-industry). Thus, the greater the IITI in electronics sector will be higher integration.

In this paper, I just use three countries in ASEAN region; there is Indonesia, Malaysia, and Thailand, because there was same competitive advantages, and exploit

economic and complementarities and economic of scale (Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT)). There was areas for cooperation include tourism, development of infrastructure, off-shore fishing and development of joint natural resources, liberalization of tariffs and harmonization of customs and immigration regulation (Austria, 2004). Then, taking into intra ASEAN-3 account trade flows in the electronics sector in ASEAN region, the value of trade in this sector is the greatest.

Intra ASEAN-3 trade relations related to the closeness of relationship, even in economic, social, and political. In addition, proximity and good communications system is also very influential. It is interesting if characteristics and value of electronics sector intra ASEAN-3 trade is associated with the degree of integration, which was approached with IIT, as well as to conduct further research about the factors that influence on IIT in electronics sector of intra ASEAN-3. On that basis, this research entitled "Analysis of factors affecting Intra Industry Trade Index in the electronics sector Intra ASEAN-3".

1.2 Research Problem

As mentioned from beginning, degree of integration in the electronics sector in each respective countries. The amount of IIT describes the magnitude of intra-industry trade. Intra-industry trade reflects a relatively minor disruption in the labor market, where the labor movement tends to occur in a similar industry, than in a different industry. So the adjustment costs will be fewer (Thorpe, 2005). In intra-industry trade theory stated that intra-industry trade occurs between countries with more availability of production factors that relatively equal. Further, the IIT in manufacturing sector is higher among countries that have comparable income levels (Tharakan, 1995).

In addition, previously also been shown that, intra ASEAN-3 trade value is relative larger than the value of ASEAN-3 trade with other countries of ASEAN member in the electronics sector in the ASEAN regions. Therefore, that would be a concern in this research is the link between intra ASEAN-3 trade values on the electronics sector with the degree of integration, which was approached by IIT.

Thus, the issue raised at the level of research is about measuring how much the IIT in the electronics sector of intra ASEAN-3. Then, the econometric analysis will be conducted about the factors that hamper the IIT.

1.3 Research Questions

This problem can be formulated as follows:

1. How much is the development of IIT in intra-ASEAN electronics sector?
2. What factors that influence the electronic sector of IIT in intra ASEAN-3?

1.4 Research Objectives

Based on the problems already noted, the purposes of this study are as follows

1. To measuring and analyze the development of IIT in electronics sector intra- ASEAN -3.
2. To examine what factors are affecting the electronics sector IIT in intra ASEAN-3

1.5 Hypothesis

Hypothesis that will be proved in this thesis is the magnitude of export and import commodities from same industry (intra-industry) in the amount of IIT, where the greater IIT in electronic sector will be higher integration. GDP and population are the factors that influence in Intra International Trade (IIT).

The scope of this research is the electronics sector in each country of ASEAN-3, such as Indonesia, Malaysia, and Thailand. The period is used 2001-2009. The current period is the period associated with data availability. Beginning of the period is 2000. While the end of the period is 2009, was chosen because it is the beginning of the implementation of Agreement framework for the Integration of Priority Sectors. With these two conditions are expected to describe Intra-Industry Trade in the electronics sector is significant increasingly.

1.6 Research Advantages

The advantages of this research are:

1. For the writer, this research can add insight about the intra-industry trade in intra-ASEAN electronics sector-3.
2. In addition, the results of this research are used to qualify by obtaining a Bachelor of Economics.
3. For the Government of Indonesia, this research is expected to be used as additional information in making policy in order to increase the participation of Indonesia electronics sector in intra-industry trade in ASEAN-3.
4. For the ASEAN-3, this research will further be used as additional information in the return policy in order to improve integration in the electronics sector.
5. For other researchers, this study is expected to be used as reference material in conducting research on intra-industry trade further.

1.7 Writing Systematic

This thesis is conducted as follow, in chapter I, Introduction, consists of background, research problems, problem definition, research questions, research objectives, hypothesis, and research advantages. In Chapter II, Theoretical Framework and Literature Review, there will be some theoretical framework and some literature reviews related to analysis of intra-industry trade theory. In chapter III, Research Methodology, this chapter provides data, methodology, and other supporting concept used to test Intra-Trade Industry index (IIT) in ASEAN-3. In chapter IV, Intra-Trade Industry index (IIT) Measurement, there is description of Intra-Trade Industry index (IIT) in the electronic sector of ASEAN-3 and policies implication. In chapter V, Analysis of factors affecting Intra-Industry Trade Index (IIT) in the electronic sector of ASEAN intra-3, it provides empirical results and analysis of this research of Intra-Industry Trade Index (IIT) in the electronic sector of ASEAN intra-3. As closing, chapter VI, Conclusion and Recommendation, conclusion and recommendation of this research is summarized in this chapter.

CHAPTER II

THEORITICAL FRAMEWORK AND LITERATURE REVIEW

2.1 Theoretical Framework

Theoretical frameworks in this research are: international trade theory, Heckscher-Ohlin (H-O), similarity of country, product cycle, economies of scale, intra-industry trade, tariff, and gravity model.

2.1.1 International Trade Theory

International trade, in wide, is the determinant of economy growth in a country, while in narrow, is the commodity exchange between countries. Basically, the several factors that encourage international trade was appearance are differences between supply and demand between countries, differences relative cost to produce certain commodity, also desire to expand export segment and increase foreign exchange.

A country will participate in international trade if it gets benefit from trade (gains from trade). That gain obtained through by specialization in production and certain commodity export which comparative advantage owned by the country.

2.1.2 Heckscher-Ohlin (H-O) Theory

H-O theory called as availability of production factors, with assumption: production factors cannot move between countries, countries have quality of production factors also taste and same appearance, same technology, face additional of constant return to scale, but different in availability of production factor (differences in supply condition).

The availability of production factor between countries caused the differences in relative price. Later, that difference will affect the differences in relative cost to produce certain commodity. This will be a reason for the occurrence of international trade. So, according to H-O theory, each country will be specialization in production, and export commodity to primary production factor in abundant country.

2.1.3 Similarity of Country Theory

Country similarity theory was proposed by Staffan Linder (1961). Different from H-O theory which focuses on supply side, country similarity theory was focus on demand side. In addition, this theory is associated with trading products manufacturing sector, where most of similar product traded.

According to similarity theory of country, a country will export manufacturing products which is supported by a large domestic market. In other words, before becoming a main of export, that product must be requested by a majority of domestic population. Large domestic market will push the products in the country to improve efficiency so can increase production to exceed the needs of the domestic market, next subsequently exported to other countries. In other side, the country will import manufacturing products that less domestic demand. Further, according to this theory, trade in manufacturing sector tends to occur between countries that tastes and income levels equivalent.

2.1.4 Intra-Industry Trade Theory

Intra-industry trade can be defined as trade within same industry. Intra-industry trade theory is included in new trade theory. One of economic figure who become a pioneer of this theory is Paul Krugman (Koo, 2005).

Different from neoclassical trade theory which state that causes of trade are specialties from difference in availability of production factor and technology (comparative advantage), intra-industry trade theory state that trade occurs between countries that still have a comparative advantage was similar. Intra-industry trade based on product differentiation and also includes 2- way trade within same industry.

2.1.4.1 Intra-industry trade phenomenon in the world

Intra-industry trade is different with inter-industry trade. On inter-industry trade in products traded from different industries. This encourages each country to focus on the production of certain commodities which have a comparative advantage. So, there will be a contraction in other production activities.

Although inter-industry trade still occurs the advanced industrial countries do intra-industry trade. Intra-industry trade is more significant when the tariff and non tariff barriers be eliminated on trade flows between countries of the European Union. On intra-industry trade, there are no contractions generated in the production activities of certain industries.

Intra-industry trade gain is greater. For example, consumers have more choices of products because of product differentiation and product price become cheaper because of increased economies of scale.

2.1.4.2 Reasons for the occurrence of intra-industry trade

Two reasons that lead to intra-industry trade are as follows.

1. **Product differentiation**

Most of product produced by the modern economy is a differentiated product. Differentiated product is same product or produced in same industry but different in quality and or preferences. Thus, there is trade in differentiated products in international trade, or in other words, the majority of international trade is intra-industry trade.

2. Economies of scale

Basically intra-industry trade occurs with the motive to earn profit from the economies of scale. That means, international competition forces each company to restrict models or types of products to concentrate for use resources in order to reduce production cost per unit, so it can generate only several kinds of products but with the best quality and competitive, while consumer demand for another model or type that will be imported from other countries.

2.1.4.3 Intra-Industry Trade index (IIT)

To measure the magnitude of intra-industry trade in a commodity, used in Intra-Industry Trade index (IIT). IIT is the basic measurement Grubel-Lloyd index. The index measures the proportion of intra-industry trade as a percentage of total trade (Austria, 2004). Calculation of index formula is as follows.

$$IIT = \left(1 - \frac{\sum|X_p - M_p|}{\sum(X_p + M_p)}\right) x100 \qquad (2.1)$$

Where:

X_p = total exports of product or industry p

M_p = total imports of product or industry p

Or:

$$IIT_{ijkt} = \left[1 - \frac{\left|\sum_{k=1} X_{ijkt} - \sum_{k=1} M_{ijkt}\right|}{\left[\sum_{k=1} X_{ijkt} + \sum_{k=1} Mijkt\right]}\right] x100 \quad (2.2)$$

Where:

i = reporter country,

j = partner country,

k = HS classification 4 digit,

t = year,

X = export,

M = import.

Absolute sign means that the sign of the trade imbalance is negligible. The index measures intra-industry trade (X+M) that was matched or balanced (X=M). The index has ranges from 0 (zero) to 100 (one hundred). If index closer to 100, so the intra-industry trade is become greater. While index closer to zero, the greater is the inter-industry trade.

The index will be estimated in relation to each bilateral trade flow between pairs of ASEAN economies, and between each member and the rest of the ASEAN as a group. The resulting IIT index will be used as an indicator of the integration going in the sectors. The degree of integration will be determined according to the following values of IIT index (Austria, 2004).

Tables 2.1 The classification of the IIT

Values of IIT index	Classification
-*	No intra-ASEAN trade reported
0.00	No integration (one-way trade)
>0.00-24.99	Weak integration
25.00-49.99	Mild integration
50.00-74.99	Moderately strong integration
75.00-99.99	Strong integration

The classification of IIT index is a slight modification of the classification, where countries as having high-industry trade if the IIT index is above 50 and low intra-industry trade if the IIT index is above 50.

2.1.5 Gravity Model

Gravity model basically uses the same formulation with Newton's gravitational model, this is express as:

$$GF_{ij} = \frac{M_i M_j}{D_{ij}} \, , where \; i \neq j \qquad (2.3)$$

In this equation, the interaction between two objects is directly proportional to its mass (M_i, M_j) and inverse compared with the distance (D_{ij}). This model was first developed by Tinberger (1962) to explain bilateral trade flows. Flow of bilateral trade on the gravity model is determined by three groups of variables, such as:

1. Variables representing the total potential demand of importing countries.
2. Variables representing the total potential supply exporting country.

3. Variables supporting or inhibiting the flow of trade between the exporting country and importing country.

Gravity models are estimated in terms of natural logarithms, denoted "ln". In this form, what is multiplied in Equation (2.3) becomes added, and what is divided becomes subtracted, translating Equation (2.3) into a linear equation:

$$lnGF_{ij} = lnM_i + lnM_j - lnD_{ij}\,, where\ i \neq j \tag{2.4}$$

Gravity models of international trade implement Equation (2.4) by using trade flows or exports from county i to country j (GF_{ij}) in place of gravitational force, with arbitrarily small numbers sometimes being used in place of any zero values. Distance is often measured using "great circle" calculations. The handling of mass in Equation (2.4) takes place via other alternatives.

The other alternatives mass is associated with GDP per capita and with both gross domestic product and GDP per capita, respectively. In these cases, Equation (2.4) becomes one of the following:

$$lnIIT_{ij} = \mu + v_1 lnGDP_i - v_2 ln\left({GDP_i}/{POP_i}\right) + v_3 lnGDP_j -$$

$$v_4 ln\left({GDP_j}/{POP_j}\right) - v_5 lnD_{ij} \tag{2.5}$$

In general, the expected signs here are $v_i, v_j > 0$. However, the economics of Equation (2.5) can lead to the interpretation of GDP as income, and when applied to electronic goods, Engels' Law allows for GDP in the destination country to have a negative influence on demand for imports. Hence it is also possible that $v_2, v_4 < 0$.

The factors affecting the IIT on electronics sector in intra ASEAN-3 and the variables that used in this study and their respective definitions is as follows.

1. Gross domestic product (GDP) is the total output of final produced by a country (Lipsey, et al., 1995).
2. GDP per capita is the value of GDP divided by population in a country.

2.2 Recent Research Review

In addition to the theories that have been described above, in making hypotheses also need to review some previous research. Here are some previous studies that assessed relevant to this study.

Research Menon (1996) aims to measure the contribution of intra-industry trade growth and the growth of net trade on the growth of ASEAN's total trade during the periods 1981-1986 and 1986-1991, particularly in the manufacturing sector.

The data used is the value of intra-ASEAN trade and extra-ASEAN in each country of ASEAN-5, during the period under study. Then the method used is the Grubel-Lloyd index (GL) to measure the index of Intra-Industry Trade (IIT). Research results show that the contribution of intra-trade growth industry on the growth of ASEAN's total trade is larger than the contribution made by net trade in most countries of ASEAN-5.

Research Austria (2004) indicated to analyze the characteristics of trade in 11 priority sectors of ASEAN during the period 1997-2001. In addition, the research also aims to measure the integration of 11 sectors, which are approximated by IIT in the year 1997-2001.

Research results indicate that IIT is relatively high only in some sectors. Among these sectors IIT relatively greater in the ICT and electronics sectors, in most countries of ASEAN-5.

Research Trope (2005) measured and analyzed factors that affect the IIT in manufacturing sectors in East Asia during the period 1970-1996. Furthermore, Thorpe split into *Horizontal IIT* (HIIT) and *Vertical IIT* (VIIT). As for HIIT arise as a result of economies of scale and product differentiation (with the same quality), while VIIT was found on the same commodity trade with different qualities.

For that, he also built the gravity model and the OLS method in econometric approach. The results showed that the factors that significantly affect the IIT in manufacturing sectors in East Asia is the GDP, the difference in GDP, GDP per capita, differences in GDP per capita, distance, exchange rates, trade imbalances, and economies of scale.

CHAPTER III

Research methodology

3.1 Types and sources of data

Data collected for this research is secondary data obtained from the publication on the internet, are the Commodity and Trade Database (COMTRADE) and the ASEAN Secretariat. The data consists of trade value on electronic sector in intra ASEAN-3, GDP and GDP per capita. Data that used in this research is panel data, i.e., the data merging in each of the ASEAN-3 countries (Indonesia, Malaysia, and Thailand) during the period 2001-2009.

3.2 Variables

The degree of integration on electronics sector in intra-ASEAN is measured by Intra-Industry Trade Index (IIT). IIT measurement refers to the amount of trade on electronics sector in intra-ASEAN-3.

Based on theories that have been described and referring to previous research, the factors that affect the IIT in the electronics sector intra ASEAN-3 are as follows:

1. Average GDP of both countries (*GDP*) as *independent variable*. IIT between two countries will increase if there is an increase in GDP of two countries. An increase in GDP of a country (an increase in market size) will encourage greater economies of scale that will ultimately increase the number of products that differentiated in the country. In addition, the increase in GDP will increase

imports of products that differentiated. As a result, IIT between two countries is increasing.

2. Average GDP per capita of both countries (*PIN*) as *independent variable*. If GDP per capita (which reflects the standard of living) in both countries increases, the IIT between two countries also increase. The higher GDP per capita will encourage increased production and demand characteristics are more diverse, such as production and demand for quality of differentiated products. This will increase differentiated of IIT in the country. In addition, the increase in GDP will increase imports of products that differentiated. As a result, IIT between two countries is decreasing.
3. The differences in GDP fluctuations between two countries (*GDPD*) as *independent variable*. Differences in GDP fluctuations decreasing between two countries make large increases IIT in intra-industry trade between two countries. GDP fluctuation difference calculation is as follows:

$$GDPD_{ijt} = \left|\Delta GDP_{it} - \Delta GDP_{jt}\right| \quad (3.1)$$

Where:

i = reporter country,

j = partner country,

t = year,

Δ = first-difference operator.

4. The difference in GDP per capita fluctuations between two countries (*PIND*) as *independent variable*. Declining of difference in GDP per capita fluctuation

between two countries makes larger increasing IIT in bilateral intra-industry trade between two countries. Difference in GDP per capita fluctuation (PIND) formula is as follows:

$$PIND_{ijt} = |\Delta PIN_{it} - \Delta PIN_{jt}| \quad (3.2)$$

Where:

i = reporter country,

j = partner country,

t = year,

Δ = first-difference operator.

3.3 Methodology

The approach that used to analyze the factors that influence IIT in electronics sector intra ASEAN-3 is a regression analysis using *gravity model*. Testing model was using *Generalized Least Squares* (GLS).

3.3.1 GLS Steps

Panel data is the observation of same cross section in some periods (time series). Panel data can be used to overcome the availability problem of data that variables represent used in the study. The benefits of using panel data are:

1. panel data is better for study of dynamics of adjustment
2. Better identify and measure the effects

3.3.1.1 Regression method

The general equation for panel data regression is as follows:

$$Y_{it} = \alpha + \beta X'_{it} + u_{ij} \quad (3.3)$$

Where:

i = Individual

t = Left

X_{it} = K is explanatory variables

3.3.1.2 Fixed effect approach

Fixed effects approach was removed by inserting dummy variables to produce different intercept of inter cross section units. That approach can be written in the following equation.

$$Y_{it} = \alpha_i + \beta X'_{it} + \varepsilon_{ij} \quad (3.4)$$

Where:

α_i = Different intercept for each cross section, X_{it} is independent toε_{ij}.

That above equation can be written in a general regression framework by including dummy variables for each unit of i in the model as follows.

$$Y_{it} = \alpha + \sum_{j=2}^{N} \alpha_i \, d_{ij} + \beta X'_{it} + \varepsilon_{ij} \quad (3.5)$$

Where:

d_{ij} = 1 if i = j and 0 for other.

Thus, there is a dummy variable as much as N-1 in the model. The parameters $\alpha, \alpha, \ldots, \alpha_{N-1}$ and β can be estimated by using *cross section weights* or GLS.

3.3.1.3 Random effect approach

The addition of dummy variables in the fixed effects approach will reduce the number of degree of freedom which is ultimately to reduce the efficiency of estimates

parameter. Therefore, in the analysis of panel data models are also known as random effect approach. This approach uses assumption that α is a random factor, an independent and identical spread between individuals. Thus, random effects approach can be written in the following equation.

$$Y_{it} = \mu + \beta X'_{it} + \alpha_i + \varepsilon_{ij} \quad (3.6)$$

Where:

μ = The average of all intercept,

$\alpha_i + \varepsilon_{ij}$ = error term,

α_i = Cross section error component that does not change over time,

ε_{ij} = last component that consisting of components of time series errors and component combination are assumed to not contain error autocorrelation.

The last component structure implies that $\alpha_i + \varepsilon_{ij}$ (error term) showed the existence of auto-correlation (except$\sigma_\alpha^2 = 0$). Thus, OLS estimators can be inappropriate and would be more efficient if GLS estimators that can be obtained by use the error covariance matrix structure.

3.3.1.4 Hausman Test

The decision to choose whether to use a fixed effects approach or random effects approach is determined by the results of statistical tests using the Hausman Test. Hausman Test conducted with the following hypothesis.

H_0 : Random effects approach

H_1 : Fixed effects approach

3.4 Model Analysis

This model analysis followed the standard of *Gravity model* According to Tinbergen (1962). This model has been use by Thrope (2005) for measuring and analyzing the factors that affect the IIT in manufacturing sectors in East Asia during the period 1970-1996.

In this study used regression by using the gravity model, where the dependent variable is Intra-Industry Trade index (IIT) in electronics sector intra ASEAN-3. While four independent variables are the average GDP of both countries (GDP_{IJt}), average GDP per capita of both countries (PIN_{IJt}), the difference of GDP fluctuations in both countries ($GDPD_{IJt}$), and differences of fluctuation in GDP per capita of two countries ($PIND_{IJt}$. The model used in this research is as follows.

$$IIT_{ijt} = \beta_0 + \beta_1 Ln(GDP_{ijt}) - \beta_2 Ln(PIN_{ijt}) + \beta_3 Ln(GDPD_{ijt}) + \beta_4 Ln(PIND_{ijt}) + \varepsilon_{ijt} \quad (3.7)$$

Where:

IIT_{IJt} = Intra-Industry Trade index (IIT) of Electronic sector between countries i (reporter) and countries j (partners) in percent (%).

GDP_{IJt} = average GDP i (reporter) and j (partners) countries in year t in millions U.S. $,

PIN_{IJt} = Average GDP per capita of i (reporter) and j (partners) countries in year t in U.S. $,

$GDPD_{IJt}$ = GDP fluctuation difference i (reporter) and j (partners) countries in year t in millions U.S. $,

$PIND_{IJt}$ = Fluctuations in GDP per capita difference i (reporter) and j (partners) countries in year t in U.S. $,

Based on above description, the hypothesis is obtained as follows:

1. GDP has positive relationship with IIT in electronics sector intra-ASEAN-3
2. PIN has negative relationship with IIT in electronics sector intra-ASEAN-3
3. GDPD has positive relationship with IIT in electronics sector intra-ASEAN-3
4. PIND has positive relationship with IIT in electronics sector intra-ASEAN-3

This hypothesis was tested by regression analysis that uses gravity model and GLS method. Furthermore, measurement and factors analysis that influence the degree of integration (which is approximated by IIT) is implicated in several policies that can be implemented by the ASEAN-3 in generally and Indonesia in particularly. The policies are to improve economic integration within ASEAN-3.

3.5 Classical Assumption

There are several criteria that are used as a basis to evaluate whether the model used is accept or not, such as the F-statistic test, the t-statistic test, the R-squared, Multicolinearity, autocorrelation, and heteroscedasticity.

F-statistic tests intended to determine whether the independent variables have a significant influence on the dependent variable or not. The step that must be done in the F-statistic test is as follows.

1. Formulation of hypothesis

   $H_0 : \beta_i = 0$

   H_1 : At least one value of β is not equal to zero

2. The determination of significance level (α).
3. Compare F-statistic with F-table at α or compare the F-statistic probability (probability (F-statistic)) with α.
4. If the F-statistic> F-table at α or probability (F-statistic) <α, then thank H. That is, the independent variables simultaneously significant effect on dependent variable.

The objective of *T-statistic test* is to determine whether each of the independent variables have a significant influence on the dependent variable or not. The step that must be done in the t-statistic test is as follows.

1. Formulation of hypothesis

   $H_0 : \beta_i = 0$

   $H_1 : \beta_i \neq 0$
2. Determination significance level (α).
3. Compare the t-statistic with t-table on α or compare the probability of t-statistic (probability (t-statistic)) with α.
4. If the t-statistic > t-table at α or probability (t-statistic) < α, then accept H. It means that independent variable is significant effect on dependent variable.

Multicolinearity can be interpreted as a strong linear relationship between the independent variables in multiple linear regression model equation. This can be detected with the R-square is high (between 0.7 and 1) but many independent variables that have not a significant effect on the dependent variable and independent variable coefficient that are inconsistent with theories or hypotheses. One way to overcome the Multicolinearity is with panel data.

Autocorrelation is a correlation at errors from different periods. Consequently, the estimator is obtained inefficient. To detect the existence of autocorrelation can be done by Durbin-Watson test statistic or by making the residuals of each cross section unit. In the graph we can see the value and fluctuation of the residuals during the period studied. The autocorrelation is shown with a large value of residuals and systematic fluctuation.

Same with autocorrelation, the presence of heteroscedasticity can obtained estimator result is not efficient. In E-views 6, this can be detected by comparing *sum squared residual* of weighted statistics and *sum squared residual* of un-weighted statistics. If sum squared *residual* of weighted statistics less than the sum squared *residual* of un-weighted statistic, so there is heteroscedasticity. To violation treatment to be used white Heteroscedasticity.

CHAPTER IV

INTRA-INDUSTRY TRADE INDEX (IIT)

4.1 Intra-industry Trade Index (IIT) Measurement

The degree of integration within each sector is measured by Intra-Industry Trade Index (IIT). Amount of IIT describes the magnitude of intra-industry trade, namely the amount of export and import commodities from the same industry. Thus, to measure the degree of integration in the electronic sector of intra-ASEAN-3 is IIT measurement. IIT complete measurement results in Appendix 2.

Based on the results of these measurements, one can say that in general there has been a fairly strong integration in the electronic sector of intra-ASEAN-3. It can be seen at IIT that a large value of more than 50 or belonging to the classification of moderately strong integration. However, this fact does not coincide with the strengthening of integration (adding value IIT) each year. This can be caused by not fully tariff barriers and non-tariff abolished. The elimination of tariffs on all electronic products sectors for ASEAN-6 countries in January, 1 2007 and the elimination of non-tariff barriers on all electronic products sectors for ASEAN-5 countries on January, 1 2010 (ASEAN Secretariat, 2004).

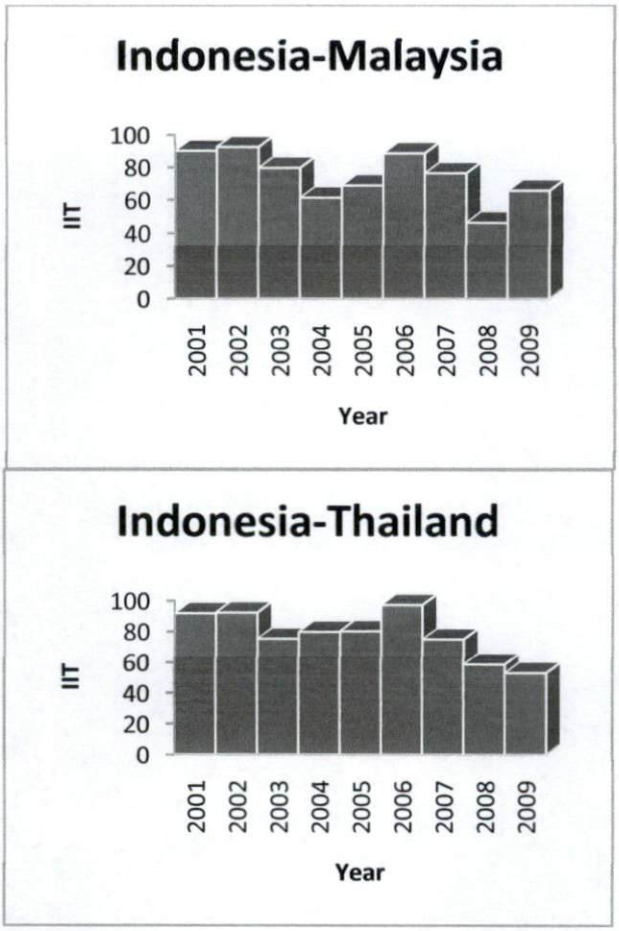
During the period studied, the integration of the electronic sector created the most powerful of Thailand (reporter) with Malaysia (partners), as indicated by the value of IIT ongoing for more than 74.99 or included in the classification of strong integration. This is because the total exports of Thailand to Malaysia are only slightly smaller than the total

imports of Thailand from Malaysia. Thailand many electronic products exported to Malaysia. In addition, Thailand also imports from Malaysia. Export and import was dominated by product group for automatic data processing machines (computers). Thus the absolute value of the trade imbalance between Thailand (reporter) with Malaysia (partner) becomes smaller, so that IIT is greater.

On the other hand, the electronic integration of the weakest sectors created between Malaysia (reporter) and Indonesia (partners). The total exports of Malaysia to Indonesia are much greater than the total imports of Malaysia from Indonesia. Malaysia many electronic products exported to Indonesia, especially for groups of automatic data processing machines products (computers). However, Indonesia has a little import from Indonesia, even Malaysia did not import from Indonesia for domestic appliances product group, incorporating electronic motors and Shavers and Hair Clippers, electronic. This implies the absolute value of the trade imbalance occurs, which in turn decrease the value of IIT.

In particular, in Figure 4.1 show the development of IIT between Indonesia (reporter) with ASEAN-3 countries.

Figure 4.1 Development of IIT Indonesia with ASEAN-3 countries.



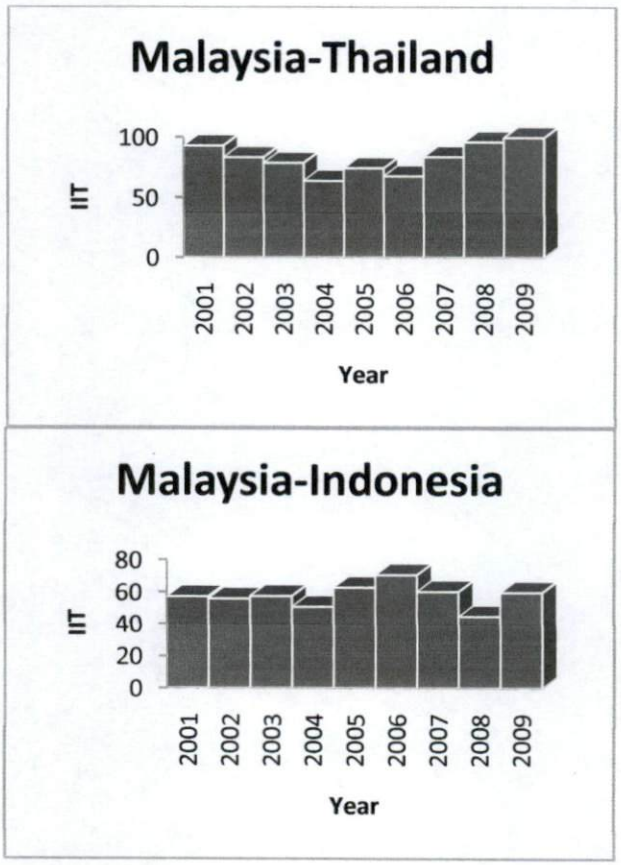
Based on the figure 4.1 it can be said that IIT between Indonesia and Malaysia has decreased. At first, there is a strong integration during the period 2001-2003. However, integration is then decreased in 2004, 2005, 2008, and 2009 to be moderately strong integration and in 2006 and 2007 have added value back into a strong integration IIT.

The value of IIT continuously decline between Indonesia and Thailand. This shows a decrease in the electronic sector integration between Indonesia and Thailand, namely the strong integration during the period 2001-2007 to be moderately strong integration during the period 2008-2009. However, the decrease was no significant effect

on reduction of integration in the electronic sector between Indonesia and Thailand. Thus, it can be concluded that Indonesia has the most powerful integration with Thailand. Meanwhile, the weakest integration was between Indonesia and Malaysia.

Development of IIT between Malaysia (reporter) with others ASEAN-3 countries figure 4.2 below.

Figure 4.2 Development of IIT Malaysia with ASEAN-3 countries.

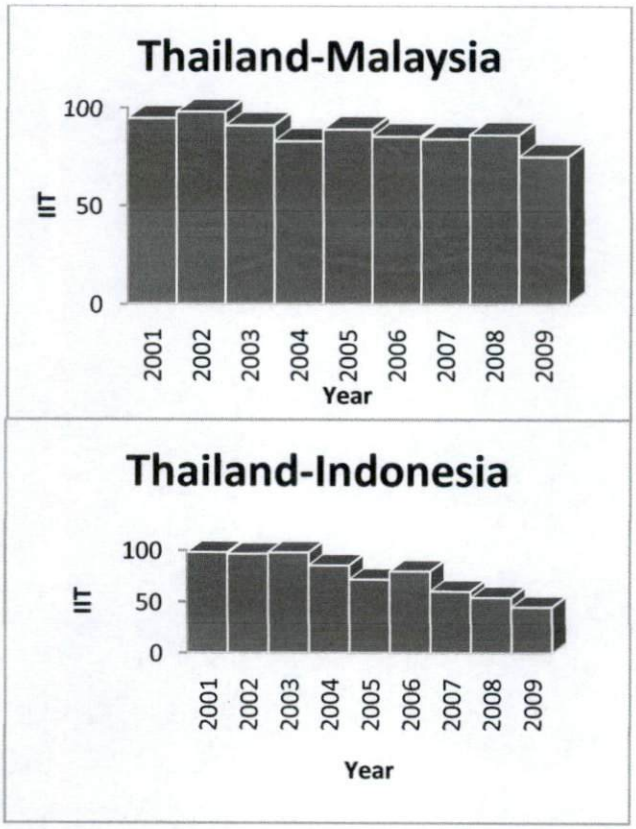


In figure 4.2 shows that IIT between Malaysia and Indonesia did not change significantly. During the period studied, the integration in the electronic sector between Malaysia and Indonesia are moderately strong integration. Meanwhile, IIT between Malaysia and Thailand has decreased, which means there is a decrease in the electronic

sector integration between Malaysia and Thailand. At first, there is a strong integration (strong integration) over the period 2001-2003. Then the integration is reduced to moderately strong integration in the years 2004-2006. Then integration is strengthened back into a strong integration in the years 2007-2009. It can be concluded that the most powerful integration between Malaysia and Thailand. Meanwhile, Malaysia and Indonesia has the weakest integration.

Development of IIT between Thailand (reporter) with the ASEAN-3 countries may be seen in Figure 4.3 below.

Figure 4.3 Development of IIT Thailand with ASEAN-3 countries.



Based on Figure 4.3, can be said that a decline in the value of IIT between Thailand and Indonesia. This means that a decrease in integration in the electronic sector,

namely the strong integration during the period 2001-2004 and 2006. Meanwhile, in the period 2005, 2007, and 2008 become a moderately strong integration. And continue to decline in 2009, namely mild integration.

At IIT between Malaysia and Malaysia is not significant change. Integration in the electronic sector between Thailand and Malaysia are strong integration, during the period under study. Thus, the most powerful integration was between Thailand and Malaysia. While the integration of the weakest place between Thailand and Indonesia.

CHAPTER V

ANALYSIS OF FACTORS AFFECTING INTRA-INDUSTRY TRADE INDEX (IIT) IN THE ELECTRONIC SECTOR OF ASEAN INTRA-3

Analysis of factors affecting Intra-Industry Trade Index (IIT) in the electronic sector of ASEAN intra-3 was done by evaluating and interpret the results of gravity model regression (using panel data) as has been mentioned in research methods.

5.1 Empirical Findings

5.1.1 Summary Statistic

The summary statistic for IIT, GDP, PIN, GDPD, and PIND rate from 1990 to 2009 are reported in table 5.1

Table 5.1 Summary Statistic

	LNIIT?	LNGDP?	LNPIN?	LNGDPD?	LNPIND?
Mean	26.791	26.748	8.734	23.359	4.984
Median	26.767	26.759	8.739	23.485	5.154
Maximum	27.459	27.413	9.413	24.822	7.157
Minimum	26.092	26.062	7.865	21.315	-1.476
Std. Dev.	0.404	0.391	0.406	1.052	1.711
Skewness	0.120	0.128	-0.349	-0.317	-2.012
Kurtosis	1.986	1.995	2.449	1.862	8.485

Source: Comtrade, data is processed with Eviews 6

Based on the table it can be seen that the number of observations used in this analysis are 54. It also provides the maximum, minimum, mean and median value of each variables used. During 2001 up to 2009 for IIT, its maximum value is 27.459, minimum value is 26.092, median is 26.767 and mean is 26.791. While GDP reaches its maximum value at 27.413, minimum at 10.73673, median at 26.759 and mean at 26.748. Also PIN reaches its maximum value is 9.413, minimum at 7.865, median at 8.739, and mean at 8.734. Furthermore, GDPD rate maximum value is 24.822, minimum is 21.315, median is 23.485 and mean is 23.359. PIND rate maximum value is 7.157, minimum is -1.476, median is 5.154 and mean is 4.984.

5.1.2 Fixed effect by EGLS result

Table 5.2 The Result of Fixed Effect Estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDP?	1.04052	0.02082	49.98911	0.00000
LNPIN?	-0.08988	0.02540	-3.53904	0.00110
LNGDPD?	0.03018	0.00153	19.79087	0.00000
LNPIND?	0.00011	0.00063	0.17163	0.86470
Weighted Statistics				
R-squared	0.99980	**Sum squared resid**		42.70478
Adjusted R-squared	0.99974	**Durbin-Watson stat**		2.26842
Prob(F-statistic)	0.00000			
Unweighted Statistics				
R-squared	0.99948	**Durbin-Watson stat**		2.29573
Sum squared resid	0.00341			

Source: Comtrade, data is processed with Eviews 6

From the table 5.2, show that: (1) fixed effect model has positive correlation in GDP_{ijt} and $GDPD_{ijt}$ and negative correlation in PIN_{ijt} and $PIND_{ijt}$, (2) MT or TM has the biggest average different in IIT, and (3) IT or TI has the lowest average different in IIT.

5.1.3 Random effect by EGLS result

Table 5.3 The Result Of Random Effect Estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDP?	0.96284	0.00602	160.02530	0.00000
LNPIN?	-0.00779	0.00440	-1.77317	0.08240
LNGDPD?	0.03429	0.00206	16.66989	0.00000
LNPIND?	0.00130	0.00117	1.10995	0.27240
Effects Specification				
			S.D.	**Rho**
Cross-section random			0.00000	0.00000
Idiosyncratic random			0.00953	1.00000
Weighted Statistics				
R-squared	0.99947	**Sum squared resid**		0.00460
Prob(F-statistic)	0.00000	**Durbin-Watson stat**		2.84094
Unweighted Statistics				
R-squared	0.99947	**Sum squared resid**		0.00460
		Durbin-Watson stat		2.84094

Source: Comtrade, data is processed with Eviews 6

The result of random effect test as shows in table 5.2 is two coefficients that have significant the result of Durbin Watson becomes *2.84094*. So, it can't predict as autocorrelation problem in this equation.

5.1.4 Classical assumption

5.1.4.1 F-test

According to F-test; if R square increases (0.9998), so F value also increases (18335.74), and finally F-test is more significant. By considering the probability of the F-statistic that is smaller than α 1 percent (0.000), it can be said that the average GDP of both countries GDP_{ijt}, average GDP per capita of both countries PIN_{ijt}, and the difference in GDP fluctuations in both countries $GDPD_{ijt}$, once influenced significantly to the *Intra-Industry Trade Index* (IIT), the real level of 1 percent.

5.1.4.2 T-test

According to T-test, if T-test is not equal with zero (0), it means that the independent variables (the average GDP variable of both countries(GDP_{ijt}), the average GDP per capita of both countries(PIN_{ijt}), and the differences in GDP fluctuations in both countries($GDPD_{ijt}$) have *significant effect to dependent variable* (*Intra-Industry Trade Index* (IIT)). Even, average GDP variable of both countries(GDP_{ijt}), differences in GDP fluctuations in both countries($GDPD_{ijt}$), and differences in GDP per capita fluctuations in both countries ($PIND_{ijt}$) have *positive value*, and average GDP per capita of both countries(PIN_{ijt}) has *negative value* of T-test. But the difference in GDP per capita fluctuations in both countries ($PIND_{ijt}$) has no significant effect to IIT.

5.1.4.3 Multicolinearity

Even thought, Multicolinearity can make a lot of variable become not significant, but coefficient of determinant (R square) still stable (high), and significant of F-test. If R square becomes strong, so the correlation between free variables also becomes stronger. It means that there is no problem with Multicolinearity.

5.1.4.4 Heteroscedasticity

In heteroscedasticity, with use *White Heteroscedasticity-Test* shows that if probability value less than 5 percent, it means that data has heteroscedasticity. But the result of this data is more than 5 percent; it means that there is *no heteroscedasticity*. For the result can show at appendix 6.

5.1.4.5 Auto correlation

In the table 5.1, the result of Auto correlation based on Durbin Watson test becomes *2.26842 for un-weighted and 2.29573 for weighted.* It's mean that rejected H_o and accepted H_1. So, there is no autocorrelation problem in this equation.

5.1.4.6 Normality

In normality use Jarque-Bera, it means statistical test to determine whether the normal distribution of data.

Table 5.4 Jarque-Bera Test

	LNIIT?	LNGDP?	LNPIN?	LNGDPD?	LNPIND?
Jarque-Bera	2.442	2.423	1.779	3.817	104.115
Probability	0.295	0.298	0.411	0.148	0.000

Source: Comtrade, data is processed with Eviews 6

If J-B value is not significant (or less than 2), so the data means *normal distribution.* And if the probability value was less than 5 percent, so the H_0 was rejected normal distribution. But if Jarque-Bera value was more than *0.05* (or more than 5 percent), so it cans accepted H_0 that data in *normal distribution.*

5.2 Interpretation Model

This research will use steps of panel data that was explained in chapter 3 to analyze what method that will used, EGLS, fixed effect, or random effect. According to Hausman-test, if panel data has total time (T) more bigger than total individual (N), it should use *Fixed Effect Model.* But if panel data has total time (T) less than individual (N), it should use *Random Effect Model.*

Table 5.5 Chow Test

Redundant Fixed Effects Tests			
Pool: Untitled			
Test cross-section fixed effects			
Effects Test	**Statistic**	**d.f.**	**Prob.**
Cross-section F	9.134303	(5,44)	0.000

Source: Comtrade, data is processed with Eviews 6

From the table 5.5 also can show that both of F-test and Chi-square are significant (where p-value less than 5 percent) it means Ho is rejected and Ha is accepted, so the conclusion is this research will use *Fixed Effect Method.*

After proceed by E-views got regression of output from panel data by using fixed effect model:

$$lnIIT_{ijt} = \beta_0 + \beta_1 Ln(GDP_{ijt}) - \beta_2 Ln(PIN_{ijt}) + \beta_3 Ln(GDPD_{ijt}) + \beta_5 Ln(PIND_{ijt})$$

The final results equation:

$$lnIIT = 0.96 + 1.04\, lnGDP - 0.09\, lnPIN + 0.03\, lnGDPD + 0.0001\, lnPIND$$

$$\begin{matrix} & -2.85 & 49.99 & -3.54 & 9.79 & 0.17 \end{matrix}$$

From the result of fixed effect estimation, got the value of coefficient R squared equal to **0.9998** it means **99.98%** IIT in the electronic sector intra ASEAN-3 is influenced by GDP, PIN, GDPD, and PIND. And **0.01%** of IIT is influenced by the other factors.

The compares F-test with F-table to find is dependent variable significantly affected by independent variable.

F-table:

$\{\alpha; df_1 = (k-1); df_2 = (n-k-1\}$

$\{\mathbf{0.05}; \boldsymbol{df_1} = \mathbf{(4-1)}; \boldsymbol{df_2} = \mathbf{(54-4-1\}}$

(0.05;3;49) = 2.79

From the result we can see the F-test > F-table (**18335.74 > 2.79**) it means that independent variable together significantly affect dependent variable. So this research can use all of these variables together to explain the IIT. By considering the probability of the F-statistic that is 0.000, it can be said that the GDP_{ijt}, PIN_{ijt}, $GDPD_{ijt}$and $PIND_{ijt}$ (independent variables), once influenced significantly to IIT_{ijt} (dependent variable).

T-test is useful in order to test the influence of independent variable or to test the significance of independence variables to dependence variables. This test has to test T-test for each of independent variable to see the significances of that variable in influencing the dependent variables.

T-table = $\{\alpha; df = (n - k)\}$

= {0.05; 54-4}

= {0.05; 50}

= 2.01

This test use two tail with level of significance α = **0.05**. We have to make hypothesis where after we test that variable we can know what hypothesis we will use. Hypothesis:

Ho = independent variable does not influence dependent significantly

Ha = independent variable influence dependent variable significantly

Ho is accepted if: –t-table ≤ t-test ≤ t-table and Ho is rejected if: -t-test < -t-table or t-test > t-table.

1. **T-test for GDP_{ijt}**

   With 5 percent of level significances and 54 level degree of freedom got the value of T-table = **2.01**. in the other side, base on estimation we get t-test or t-statistic for GDP_{ijt} = **49.99** with hypothesis:

   Ho = GDP_{ijt} does not influence change of IIT_{ijt} significantly

   Ha = GDP_{ijt} influences change of IIT_{ijt} significantly

   Found t-test > t-table where **49.99 > 2.01**, Ho is rejected, it means GDP_{ijt} significant to explain and influence change of dependent variable IIT_{ijt}

2. **T-test for PIN_{ijt}**

With 5% of level significances and 54 level degree of freedom got the value of T-table = **2.01**. In the other side, base on estimation we get t-test or t-statistic for PIN_{ijt} = **-3.54** with hypothesis:

Ho = PIN_{ijt} can explain or influence change of dependent variable IIT_{ijt} significantly.

Ha = PIN_{ijt} can't explain and influence change of dependent variable IIT_{ijt} significantly.

Found t-test > t-table where **-3.54 < 2.01**where Ho is accepted, it means PIN_{ijt} not significant to explain and influence change of IIT_{ijt}.

3. **T-test for $GDPD_{ijt}$**

With 5% of level significances and 54 (total data) level degree of freedom got the value of T-table = **2.01**. In the other side, base on estimation we get t-test or t-statistic for $GDPD_{ijt}$ = **19.79**, so with hypothesis:

Ho = $GDPD_{ijt}$ cannot explain or influence change of dependent variable IIT_{ijt} significantly

Ha = $GDPD_{ijt}$can explain and influence change of dependent variable IIT_{ijt} significantly

Found T-test > t-table where **19.79 > 2.01**where Ho is rejected, it means independent variable $GDPD_{ijt}$significant to explain change of and influence dependent variable IIT_{ijt}.

4. **T-test for $PIND_{ijt}$r**

With 5% of level significances and 40 (total data) level degree of freedom got the value of T-table = **2.01**. In the other side, base on estimation we get t-test or t-statistic for $PIND_{ijt}$ = **0.17**, so with hypothesis:

Ho = $PIND_{ijt}$ can explain or influence change of dependent variable IIT_{ijt} significantly.

Ha = $PIND_{ijt}$ can't explain and influence change of dependent IIT_{ijt} significantly.

Found T-test > t-table where **0.17 < 2.01** where Ho is accepted, it means independent variable $PIND_{ijt}$ no significant to explain change of and influence dependent variable IIT_{ijt}.

5.3 Policy Implications

From the result of regression found that three variables have a positive relationship with IIT, there are GDP_{ijt}, $GDPD_{ijt}$, and $PIND_{ijt}$, and one variable has a negative relationship with IIT, there is PIN_{ijt}.

Variable of GDP_{ijt} has positive effect on IIT. This is consistent with the hypothesis that has been stated previously. Increase of GDP reflects the higher standard of living, where there are characteristics that demand more diverse and higher quality. This will spur increased production efficiency to meet the needs of the market. Thus, there is increasing demand and production quality, which in turn increase the IIT.

Variable PIN_{ijt} has negative influence on IIT. Where, the equality of GDP per capita illustrates the availability of production factors are relative equal. Or in other words, describe the same relative comparative advantage. In addition, GDP per capita equivalence to show the similarities in consumer tastes. A similar variety in the conditions of supply and demand drives the market to provide products to take advantage of economies of scale, which in turn increases IIT.

In general, the steps taken is to combine the advantages of each ASEAN member countries to create regional economic benefits of the ASEAN region, facilitate and promote investment in the ASEAN region, and to build a region that is conducive to the activities of manufacturing industry and other industries. In this research, electronic sectors include electronic equipment and household electrical, electronic data process equipment, medical and industrial equipment, communications equipment, radar, automotive electronics, machinery equipment from electrical and electronic products, and other equipment to manufacture.

According to the growth in Thailand's intra-ASEAN trade between 1986 and 1991 is a result of intra-industry trade growth, while in Malaysia and Singapore the figure is above 60 per cent (Menon, 1996). While all the growth in Indonesia's and the Philippines' intra-ASEAN trade was due to growth in net trade between 1981 and 1986, over the period 1986 and 1991 intra-industry trade growth contributed almost half the growth in intra-ASEAN trade in the Philippines, and almost one-third of the growth in trade in Indonesia. While intra-industry trade has previously been considered to be prevalent only in the trade of the developed world, our results suggest that not only is

intra-industry trade increasing rapidly in trade among the developing countries of ASEAN, but that intra-industry trade has recently become more significant in trade among these countries than it is in trade with the industrialized countries.

Based on above, it is reasonable to expect that intra-industry trade will continue to grow in importance as these countries continue to industrialize, and as they pursue more liberal trading regimes. In light of this, it would appear that the various concerns expressed by producers in relation to perceived adjustment pressures resulting from liberalization under AFTA may be misplaced, or at least overstated.

In the current trade patterns of the US auto-industry trade with its over 200 trading partner during the period 1996-2008, a period during in which there were several important developments that reshaped the structure of auto-industry, particularly by focusing on intra-industry trade and export margins of trade. In particular, with the expansion of exports to new industries, it measured as extensive margin increases intra-industry trade of the US for auto-parts industry and decreases intra-industry trade of the US for motor vehicle industry. An increase in intensity of exports in existing industries, it measured as intensive margin does not affect intra-industry trade of the US motor vehicle industry and auto-parts industry.

The results show that the US auto-industry trade is mainly inter-industry trade with around 95 % share of total trade in 2008. However, the shares of intra-industry trade have exhibited increased importance over the period. Another important finding is that IIT tends to be high among countries that are similar in terms of economic development and factor endowments. In contrast, the US increasingly carries more

IIT in auto-parts with countries that are different in terms of incomes in recent years. These facts lead to conclusion that the international fragmentation has become an essential part of the US auto-industry.

CHAPTER VI

CONCLUSIONS AND SUGGESTIONS

6.1 Conclusion

This research measures the degree of integration of two-way trade in the electronic sector in ASEAN-3 during the period 2001-2009, the period which there is a significant trade liberalization and trade expansion in the region. Measuring the degree of integration is done by calculating the *Intra-Industry Trade Index* (IIT) during the period studied.

1. The results of IIT in the most of observations show the value of more than 50. The integration in the electronic sector of ASEAN intra-3 during the period 2001-2009 is quite strong. So, the electronics sector is one sector of the main drivers in the ASEAN-3 economies that should be prioritized in the context of economic integration in the ASEAN region in general and the ASEAN-3 in particular.
2. The most powerful integrations in the electronic sector in ASEAN-3 are between Indonesia (*reporter*) with Thailand (*partners*) and between Indonesia (*reporter*) with Malaysia (*partners*). Meanwhile, the weakest integration is between Malaysia (*reporter*) and Indonesia (*partners*).
3. The average variable GDP of both countries (GDP_{ijt}), the average GDP per capita of both countries (PIN_{ijt}), and the difference in GDP fluctuations in both countries ($GDPD_{ijt}$) significantly affect the two countries towards IIT (IIT_{ijt}).
4. The different fluctuations in GDP per capita of both countries ($PIND_{ijt}$) has no effect on IIT_{ijt}.

5. Increased IIT_{ijt} is an implication of increased GDP_{ijt}, increased $GDPD_{ijt}$ and increase $PIND_{ijt}$.
6. Decrease IIT_{ijt} is an implication of increased PIN_{ijt}.

6.2 Recommendation

According to the research result and discussion in the previous chapter, there is close relationship between GDP_{ijt} andIIT_{ijt}, they have simultaneously relationship.

There are some recommendations as follows:

1. Control of IIT directly can affect GDP, so government should imply appropriate policy to manage GDP while perceive the effect to IIT.
2. GDP has big influence to IIT simultaneously moreover in economic integration. Government should notice GDP increase can make more import for Indonesia. Government should control of import carefully.
3. GDPD is the second influential variable for economic integration. Government should notice different GDPD increase to increase IIT.

The government of Indonesia should more optimal use of *economies of scale* in the electronic sector so as to Increase Intra-Industry trade in that sector, particularly in the ASEAN-3, where it has established economic cooperation is quite good and there are efforts to increase the sustainable interstate commerce.

The time series used in only 9 years so that was not enough to be able to describe the development of IIT in the electronic sector of intra-ASEAN-3. Therefore, authors may submit further suggestions for other researchers to use a longer period in his research.

REFERENCES

Austria, M.S. (2004). "The Pattern of Intra-ASEAN Trade in Priority Goods Sectors". *Final Main Report, 3/006e: 1-176.*

Deperindag (2002). "Database". *[COMTRADE Online]. Contrade.un.org.*

Deperindag. (2002). "Implemen tasi AFTA Sejak 1992". *[Deperindag Online]. www.deperindag.go.id.*

ASEAN Secretariat. (2002). "ASEAN Accelerates Integration of Priority Sectors". *[ASEAN Secretariat Online]. www.asean.org.*

ASEAN Secretariat. (2008). "ASEAN Statistics". *[ASEAN Secretariat Online]. www.asean.org.*

ASEAN Secretariat. (2004). "Declaration of ASEAN Concorde II". *[ASEAN Secretariat Online]. www.asean.org.*

Cuyvers, Ludo, and Wisarn Pupphavesa (1996). "From ASEAN to AFTA". *CAS Discussion paper No. 6.* Damuri , Yose Rizal, Raymond Atje, and Arya B. Gaduh (2006). "Integration and Specialization in East Asia". *CSIS Working Paper Series, WPE 094.*

Faustino, Horacio (2008)."Intra-Industry Trade and Revealed Comparative Advantage: An Inverted-U Relationship".

Tambunan, T (2004). "Globalisasi and Perdagangan International". *Ghalia Indonesia, Bogor.*

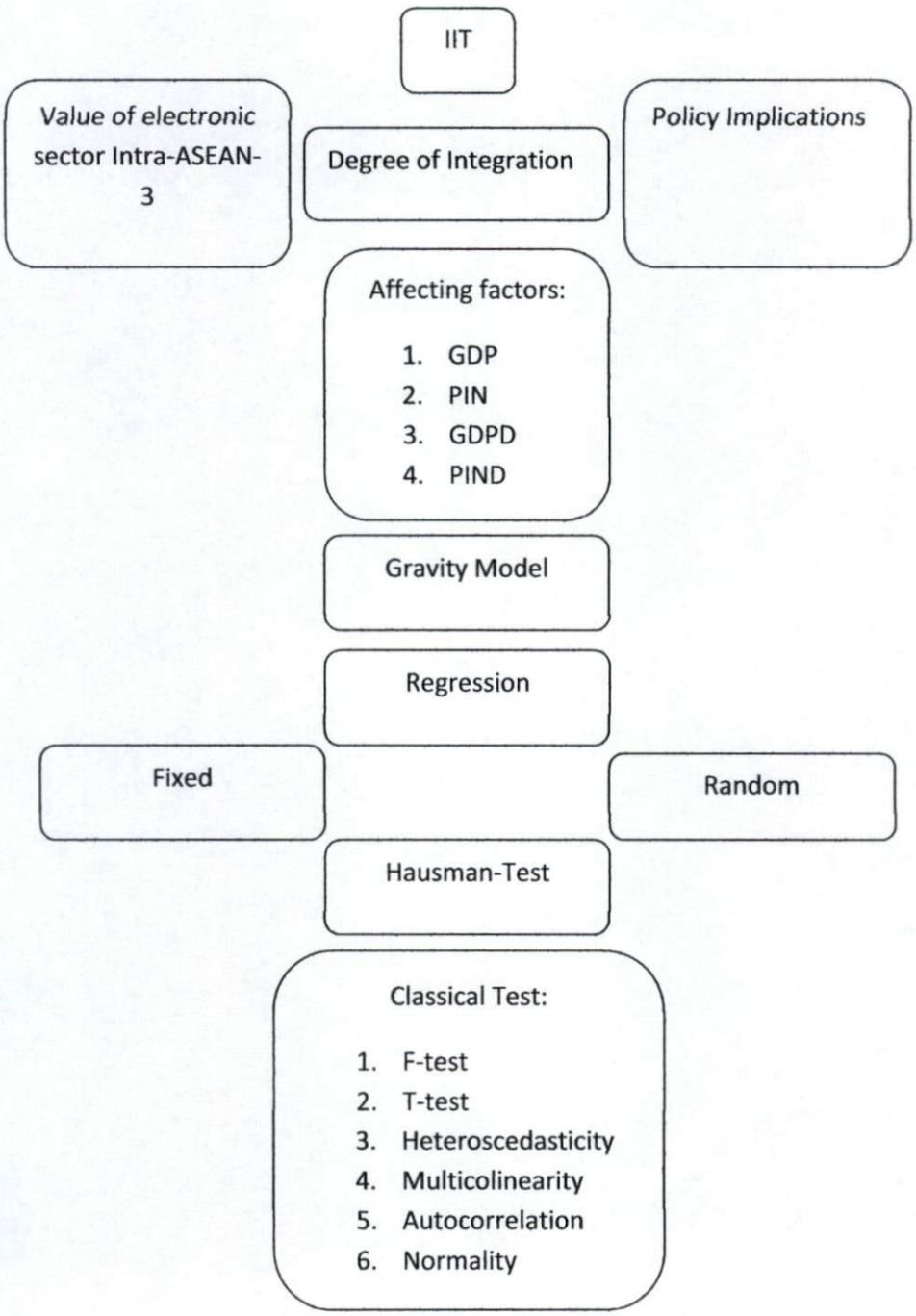
Tharakan, M.P.K, and B Kertens (1995). "Does North- South Horizontal Intra-Industry Really Exist? An Analysis of the Toy Industry". *Weltwirtschaftliches Archiv, 131 (1): 88-105.*

Turkcan, Kemal, and Yushi Yoshida (2010). "Extensive and Intensive Margins of U.S. Auto Industri Trade".

Wattanapruttipaisan, Thitapha (2008). "Priority Integration Sectors in ASEAN: Supply-side Implications and Options". *Asian Development Review, vol. 24, no. 2, pp.64–89.*

APPENDIX

Appendix 1. Literature Framework on IIT in electronic sector intra ASEAN-3



Appendix 2. Intra-industry Trade Index (IIT) Result

Country	Year	IIT
Indonesia-Thailand	2001	91.795
	2002	92.216
	2003	75.164
	2004	79.682
	2005	80.078
	2006	97.227
	2007	74.780
	2008	58.526
	2009	52.908
Indonesia-Malaysia	2001	90.164
	2002	92.365
	2003	79.710
	2004	61.337
	2005	68.843
	2006	88.570
	2007	76.437
	2008	46.325
	2009	65.635
Malaysia-Thailand	2001	92.919
	2002	83.233
	2003	78.582
	2004	63.816
	2005	74.300
	2006	67.771
	2007	83.707
	2008	96.055
	2009	99.720
Malaysia-Indonesia	2001	57.055
	2002	55.760
	2003	57.329
	2004	50.616
	2005	62.651

	2006	70.575
	2007	60.135
	2008	44.590
	2009	59.669
Thailand-Malaysia	2001	94.675
	2002	97.930
	2003	91.046
	2004	83.012
	2005	89.049
	2006	85.452
	2007	84.084
	2008	86.201
	2009	75.003
Thailand-Indonesia	2001	97.959
	2002	96.519
	2003	97.797
	2004	85.468
	2005	71.729
	2006	79.701
	2007	60.332
	2008	54.331
	2009	44.963

Appendix 3. Summary statistic

	LNIIT?	LNGDP?	LNPIN?	LNGDPD?	LNPIND?
Mean	26.791	26.748	8.734	23.359	4.984
Median	26.767	26.759	8.739	23.485	5.154
Maximum	27.459	27.413	9.413	24.822	7.157
Minimum	26.092	26.062	7.865	21.315	-1.476
Std. Dev.	0.404	0.391	0.406	1.052	1.711
Skewness	0.120	0.128	-0.349	-0.317	-2.012
Kurtosis	1.986	1.995	2.449	1.862	8.485
Jarque-Bera	2.442	2.423	1.779	3.817	104.115
Probability	0.295	0.298	0.411	0.148	0.000
Sum	1446.713	1444.392	471.616	1261.403	269.142
Sum Sq. Dev.	8.643	8.097	8.747	58.638	155.246
Observations	54	54	54	54	54
Cross sections	6	6	6	6	6

Appendix 4. The Estimation of Fixed Effect Result Based on Pooled EGLS

Dependent Variable: LNIIT?
Method: Pooled EGLS (Cross-section SUR)
Date: 01/20/11 Time: 10:25

Sample: 2001 2009
Included observations: 9
Cross-sections included: 6
Total pool (balanced) observations: 54
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-8.53619	0.33769	-2.84540	0.00720
LNGDP?	1.04052	0.02082	49.98911	0.00000
LNPIN?	-0.08988	0.02540	-3.53904	0.00110
LNGDPD?	0.03018	0.00153	19.79087	0.00000
LNPIND?	0.00011	0.00063	0.17163	0.86470
AR(1)	-0.43054	0.12864	-3.34692	0.00190

Fixed Effects (Cross)

_INDONESIAMALAYSIA—C	0.00838
_INDONESIATHAILAND—C	-0.04739
_MALAYSIAINDONESIA—C	0.00838
_MALAYSIATHAILAND—C	0.03901
_THAILANDINDONESIA—C	-0.04739
_THAILANDMALAYSIA—C	0.03901

Effects Specification
Cross-section fixed (dummy variables)
Weighted Statistics

R-squared	0.999798	Mean dependent var		2471.155
Adjusted R-squared	0.999744	S.D. dependent var		4029.002
S.E. of regression	1.074329	Sum squared resid		42.70478
F-statistic	18335.74	Durbin-Watson stat		2.268422
Prob(F-statistic)	0			
Unweighted Statistics				
R-squared	0.999476	Mean dependent var		26.86001
Sum squared resid	0.00341	Durbin-Watson stat		2.295732

Appendix 5. The Estimation of Random Effect Result Based on Pooled EGLS

Dependent Variable: LNIIT?
Method: Pooled EGLS (Cross-section random effects)
Date: 01/20/11 Time: 10:23
Sample: 2001 2009
Included observations: 9
Cross-sections included: 6
Total pool (balanced) observations: 54
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.29754	0.13085	2.27388	0.02740
LNGDP?	0.96284	0.00602	160.02530	0.00000
LNPIN?	-0.00779	0.00440	-1.77317	0.08240
LNGDPD?	0.03429	0.00206	16.66989	0.00000
LNPIND?	0.00130	0.00117	1.10995	0.27240
Random Effects (Cross)				
_INDONESIAMALAYSIA—C	0.00000			
_INDONESIATHAILAND—C	0.00000			
_MALAYSIAINDONESIA—C	0.00000			
_MALAYSIATHAILAND—C	0.00000			
_THAILANDINDONESIA—C	0.00000			
_THAILANDMALAYSIA—C	0.00000			
Effects Specification				
			S.D.	Rho
Cross-section random			0.00000	0.00000
Idiosyncratic random			0.00953	1.00000
Weighted Statistics				
R-squared	0.99947	Mean dependent var		26.79098
Adjusted R-squared	0.99943	S.D. dependent var		0.40382
S.E. of regression	0.00969	Sum squared resid		0.00460
F-statistic	23024.36000	Durbin-Watson stat		2.84094
Prob(F-statistic)	0.00000			
Unweighted Statistics				
R-squared	0.99947	Mean dependent var		26.79098
Sum squared resid	0.00460	Durbin-Watson stat		2.84094

Appendix 6. White Heteroscedasticity-Test

Heteroskedasticity Test: White			
Indonesia-Thailand			
F-statistic	0.79859	Prob. F(4,4)	0.584
Obs*R-squared	3.99608	Prob. Chi-Square(4)	0.407
Scaled explained SS	0.56900	Prob. Chi-Square(4)	0.966
Indonesia-Thailand			
F-statistic	0.15623	Prob. F(4,4)	0.950
Obs*R-squared	1.21611	Prob. Chi-Square(4)	0.875
Scaled explained SS	0.17693	Prob. Chi-Square(4)	0.996
Malaysia-Indonesia			
F-statistic	0.79845	Prob. F(4,4)	0.584
Obs*R-squared	3.99568	Prob. Chi-Square(4)	0.407
Scaled explained SS	0.56897	Prob. Chi-Square(4)	0.966
Malaysia-Thailand			
F-statistic	0.48578	Prob. F(4,4)	0.749
Obs*R-squared	2.94256	Prob. Chi-Square(4)	0.568
Scaled explained SS	0.26945	Prob. Chi-Square(4)	0.992
Thailand-Indonesia			
F-statistic	0.15623	Prob. F(4,4)	0.950
Obs*R-squared	1.21609	Prob. Chi-Square(4)	0.875
Scaled explained SS	0.17698	Prob. Chi-Square(4)	0.996
Thailand-Malaysia			
F-statistic	0.48561	Prob. F(4,4)	0.749
Obs*R-squared	2.94189	Prob. Chi-Square(4)	0.568
Scaled explained SS	0.26945	Prob. Chi-Square(4)	0.992

Appendix 7. The value of dependent and independent variables

country	year	lnIIT	lnGDP	lnPIN	lnGDPD	lnPIND	lnDIST
IM	2001	26.27156	26.25757	8.44984	21.99533	4.54284	7.271655
IM	2002	26.50296	26.41534	8.53435	24.02471	4.59151	7.271655
IM	2003	26.64947	26.56673	8.62296	24.11626	4.86338	7.271655
IM	2004	26.68711	26.66760	8.72293	22.74057	6.01309	7.271655
IM	2005	26.80924	26.77258	8.80776	23.48498	5.73283	7.271655
IM	2006	27.08841	26.97898	8.94068	24.82174	5.61156	7.271655
IM	2007	27.20897	27.15081	9.09984	24.33551	6.63001	7.271655
IM	2008	27.37774	27.31973	9.25493	24.50164	6.75014	7.271655
IM	2009	27.39731	27.32091	9.14624	24.78756	7.15664	7.271655
IT	2001	26.35304	26.34361	7.86530	21.68453	4.62033	7.755275
IT	2002	26.57089	26.49949	7.97887	23.89601	-1.47616	7.755275
IT	2003	26.71663	26.65660	8.10456	23.87378	3.89321	7.755275
IT	2004	26.76719	26.75917	8.20472	21.93669	5.15375	7.755275
IT	2005	26.88919	26.85931	8.28861	23.36375	4.44480	7.755275
IT	2006	27.15238	27.07205	8.46768	24.59084	4.63699	7.755275
IT	2007	27.28362	27.24395	8.63264	24.03669	5.68183	7.755275
IT	2008	27.45266	27.38660	8.74660	24.70255	3.38297	7.755275
IT	2009	27.45934	27.41292	8.73904	24.36613	5.53402	7.755275
MI	2001	26.27156	26.25757	8.44984	21.99533	4.54284	7.271655
MI	2002	26.50296	26.41534	8.53435	24.02471	4.59151	7.271655
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MI	2007	27.20897	27.15081	9.09984	24.33551	6.63001	7.271655
MI	2008	27.37774	27.31973	9.25493	24.50164	6.75014	7.271655
MI	2009	27.39731	27.32091	9.14624	24.78756	7.15664	7.271655
MT	2001	26.09159	26.06234	8.65475	22.54510	2.02428	6.796734
MT	2002	26.16569	26.15140	8.72410	21.91079	4.59382	6.796734
MT	2003	26.28106	26.25603	8.80532	22.58066	4.38692	6.796734
MT	2004	26.39398	26.37957	8.91289	22.14710	5.46242	6.796734
MT	2005	26.47937	26.47363	8.99417	21.31493	5.41012	6.796734
MT	2006	26.65301	26.61942	9.11710	23.24273	5.13779	6.796734
MT	2007	26.81774	26.79592	9.27993	22.98190	6.13989	6.796734
MT	2008	26.94572	26.92621	9.41346	22.99889	6.71504	6.796734
MT	2009	26.89055	26.84765	9.29856	23.72015	6.93676	6.796734

TI	2001	26.35304	26.34361	7.86530	21.68453	4.62033	7.755275
TI	2002	26.57089	26.49949	7.97887	23.89601	-1.47616	7.755275
TI	2003	26.71663	26.65660	8.10456	23.87378	3.89321	7.755275
TI	2004	26.76719	26.75917	8.20472	21.93669	5.15375	7.755275
TI	2005	26.88919	26.85931	8.28861	23.36375	4.44480	7.755275
TI	2006	27.15238	27.07205	8.46768	24.59084	4.63699	7.755275
TI	2007	27.28362	27.24395	8.63264	24.03669	5.68183	7.755275
TI	2008	27.45266	27.38660	8.74660	24.70255	3.38297	7.755275
TI	2009	27.45934	27.41292	8.73904	24.36613	5.53402	7.755275
TM	2001	26.09159	26.06234	8.65475	22.54510	2.02428	6.796734
TM	2002	26.16569	26.15140	8.72410	21.91079	4.59382	6.796734
TM	2003	26.28105	26.25603	8.80532	22.58066	4.38692	6.796734
TM	2004	26.39398	26.37957	8.91289	22.14710	5.46242	6.796734
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TM	2007	26.81774	26.79592	9.27993	22.98190	6.13989	6.796734
TM	2008	26.94572	26.92621	9.41346	22.99889	6.71504	6.796734
TM	2009	26.89055	26.84765	9.29856	23.72015	6.93676	6.796734